



Do pesticides affect the intestinal bacterial community and does this have health implications?

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Abstract

Title

Do pesticides affect the intestinal bacterial community and does this have health implications?

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Background

The intestinal bacterial community is now recognized as an important factor for health and implicated in numerous states of disease including, but not limited to, inflammatory bowel diseases. Despite the fairly extensive regulatory demands for risk assessment of pesticides in relation to human exposure, there is currently very little knowledge related to potential effects on the gut microbiota. It has however recently been speculated that glyphosate based herbicides may affect the gut microbiota of humans and animal husbandry due to inhibition of the Shikimate pathway in bacteria causing loss of aromatic amino acid synthesis and growth inhibition, supported by *in vitro* studies. Here we present results from the first animal trial to address this question.

Methods

Sprague Dawley rats (n=20/group) were exposed to glyphosate at 5x and 50x the acceptable daily intake (ADI) for humans. 16S rRNA gene sequencing of the bacterial community and liquid chromatography mass spectrometry (LC-MS) based metabolic profiling of aromatic amino acids and their downstream metabolites was applied to intestinal samples obtained after two weeks of oral dosing.

Results

We found that glyphosate had very limited effects on bacterial community composition even at the highest exposure concentration. Also we find relatively high concentrations of aromatic amino acids in the intestine of the animals.

Discussion and conclusion

Our data show that glyphosate inhibits bacterial growth in minimal medium but this inhibitory effect is relieved in the presence of aromatic amino acids in the growth medium. Results from the animal trial suggest that sufficient levels of aromatic amino acids are present in the rat intestine to alleviate the need for bacterial synthesis and thus prevent an antimicrobial effect of glyphosate *in vivo*.

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